Database System Concepts

What is data?

** Data can be defined in many ways. Information science defines data an unprocessed information.

What is information?

 ** Information is data that have been organized and communicated in a coherent and meaningful manner.

** Knowledge is information evaluated and organized so that it can be used purposefully

- Data is converted into information, and information is converted into knowledge. as shown in figure (1.1)

Figure (1.1)
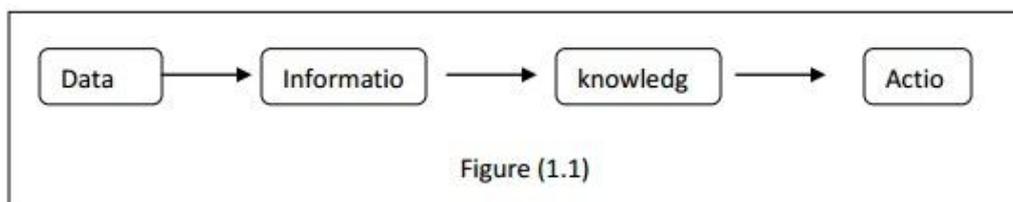
What is a Data Base ?

    A database is an organized collection of data for one or more uses, typically in digital form. The data can be textual, like order or inventory data, or it can be pictures, programs or anything else that can be stored on a computer in binary form.

One way of classifying databases involves the type of their contents, for example: bibliographic, document-text, statistical.

 The purpose of a database is to store and retrieve related information, so databases are designed to offer an organized mechanism for :

 - Storing

 - managing

 - and retrieving information.

What is DBMS ?

A Database Management System (DBMS) is a set of computer programs that controls the –

 - Creation of the database

 - The storing and organization of the data in the database

 - Maintenance the database

 - Searching ,data retrieval and the use of a database.

The DBMS accepts requests for data from an application program and instructs the operating system to transfer the appropriate data as shown in figure (1.2)

ADVANTAGES OF A DBMS

 1- Database Development: It allows organizations to place control of database development in the hands of database administrators (DBAs) and other specialists.

 2-Data independence: Application programs should be as independent as possible from details of data representation and storage. The DBMS can provide an abstract view of the data to insulate application code from such details.

 3-Efficient data access: A DBMS utilizes a variety of sophisticated techniques to store and retrieve data efficiently. It allows different user application programs to easily access the same database. Instead of having to write computer programs to extract information, user can ask simple questions in a query language.

 4-Data integrity and security: If data is always accessed through the DBMS, the DBMS can enforce : • integrity constraints on the data. For example, before inserting salary information for an employee, the DBMS can check that the department budget is not exceeded. • Also, the DBMS can enforce access controls that govern what data is visible to different classes of users.

 5-Crash recovery: the DBMS protects users from the effects of system failures.

6- Data administration and Concurrent access: When several users share the data(more than one user access the database at the same time), DBMS

schedules concurrent accesses to the data in such a manner that users can think of the data as being accessed by only one user at a time.

Figure (1.2)

DBMS
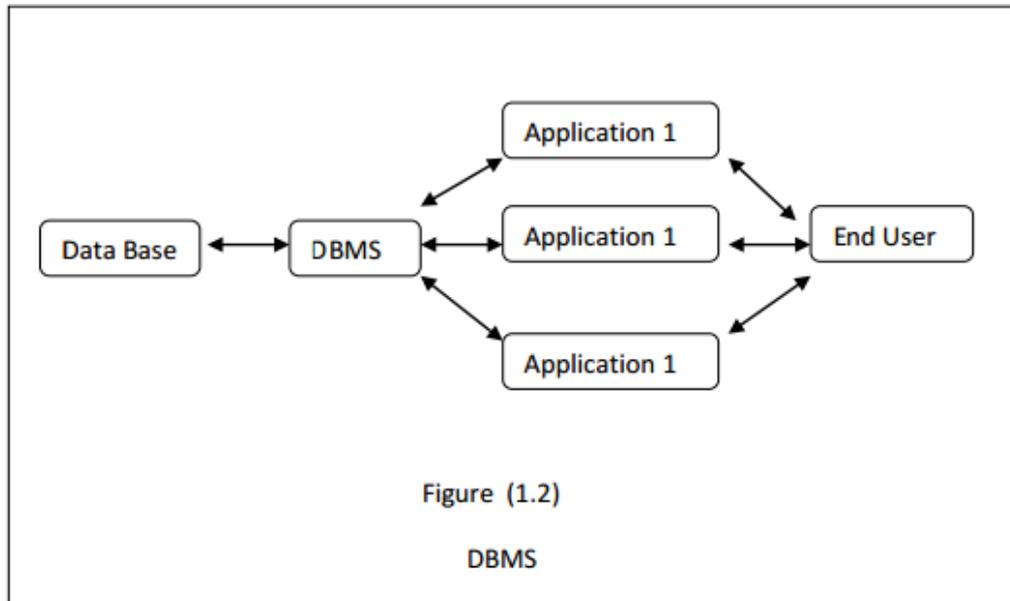
Data Abstraction

The major purpose of a database system is to provide users with an abstract view of the data. That is , the system hides certain details of how the data are stored and maintained.

 For the system to be usable, it must retrieve data efficiently. This had led to the design of complex data structure to represent the data in the data base. Since many database-user are not computer trained , data base developers hide the complexity from users through several levels of abstraction as shown in figure (1.3).

** Physical level : the lowest level of abstraction, describe how the data are actually stored. At the Physical level , complex low level data structure are described in detail. In this level storage locations used to specify where the data are and the data been described by words and bytes.

** Logical level : This level describe what data are stored in the database and what relationship exist among those data. The entire database is describe in

terms of small number of relatively simple structure. The logical level is used by the database administrator, who must decide what information is to be kept in the database.

** View level : The highest level of abstraction describes only part of the entire database. Many users of the database system will not be concern with all the information. Instead the user need to access only part of the database , so a view level of abstraction is defined .

 The system may provide many views for the same database.

Figure (1.3)

The three level of abstraction